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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/526,489	03/04/2005	Yasuhisa Kitahara	023971-0544	1853

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EXAMINER	
TRAN, DIEM T	

ART UNIT	PAPER NUMBER
3748	

MAIL DATE	DELIVERY MODE
02/03/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/526,489	KITAHARA, YASUHISA	
	Examiner	Art Unit	
	DIEM TRAN	3748	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 November 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-14 and 16-36* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2-14,16-36* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

In view of the Appeal Brief filed on 11/4/08, **PROSECUTION IS HEREBY REOPENED.** A new non-final rejection is set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) request reinstatement of the appeal.

If reinstatement of the appeal is requested, such request must be accompanied by a supplemental appeal brief, but no new amendments, affidavits (37 CFR 1.130, 1.131 or 1.132) or other evidence are permitted. See 37 CFR 1.193(b)(2).

Overall, claims 2-14, 16-36 are pending in this application.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2-14, 16-19, 27-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zukouski et al. (US 6,378,487) in view of Salvat et al. (US Patent 6,412,276).

Regarding claims 2, 11, 14, 16, 27-36, Zukouski discloses a combustion control apparatus for an internal combustion engine, comprising:

a combustion controlling actuator to cause main combustion, and to cause preliminary combustion prior to the main combustion; and a controller to control fuel injection to produce the preliminary combustion, and to control fuel injection to start the main combustion after an end of the preliminary combustion (see Figure 2A); wherein the combustion controlling actuator includes a fuel injector to inject fuel directly into a combustion chamber of the engine; and the controller is configured to perform a preliminary fuel injection to produce the preliminary combustion at or near top dead center, and to perform a main fuel injection to start the main combustion after the preliminary combustion is finished such that a premixed combustion process is predominant in the main combustion, the preliminary fuel injection being immediately prior to the main fuel injection (205) (see Figure 2A), and wherein the controller is configured to perform the preliminary fuel injection at such a timing as to cause a heat releasing process of the preliminary combustion to start before compression top dead center and to end after compression top dead center (see Figure 3A, col. 5, lines 1+); however, fails to disclose an exhaust purifier is located in an exhaust passage of the internal combustion engine. Salvat teaches that a particulate filter (8) is located in the exhaust passage to reduce harmful emission (see Figure 1).

It would have been obvious to one having ordinary skill in the art, to have utilized the teaching of Salvat in the Zukouski system, since the use thereof would have reduced harmful particulate emissions from the engine.

Regarding claim 3, Salvat further teaches controlling actuator in a split combustion mode by controlling the fuel injection to produce the preliminary combustion at or near top dead

center, and by controlling the fuel injection to start the main combustion after the end of the preliminary combustion when a split combustion request is produced to bring the exhaust purifier to an operative state (see col. 2, lines 61+, col. 3, lines 1-20).

Regarding claims 4-6, 19, 31, Salvat further teaches controlling actuator normally in a normal combustion mode, and to change over a combustion control mode from the normal combustion mode to the split combustion mode in response to the split combustion request produced in accordance with a condition of the exhaust purifier (see col. 2, lines 47-67).

Regarding claims 7-9, Zukouski further discloses the controller is configured to delay the start of the main combustion with respect to the end of the preliminary combustion (see Figure 2A).

Regarding claims 10, 17, 18, Salvat further teaches controlling a preliminary fuel injection quantity of the preliminary fuel injection to a smaller quantity required to increase an in cylinder temperature in the combustion chamber, and to make a main fuel injection quantity of the main combustion greater than the preliminary fuel injection quantity, to produce engine torque with the main combustion (see col. 3, lines 20-24).

Regarding claim 12, Zukouski further discloses that an amount of retard of a combustion start timing of the main combustion with respect to a combustion start timing of the preliminary combustion is equal to or greater than 20° in crank angle (see Figure 2A)

Regarding claim 13, Zukouski further discloses that an amount of retard of a combustion end timing of the main combustion with respect to compression top dead center is equal to or greater than 50° in crank angle (see Figure 2A).

Claims 20-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zukouski et al. (US 6,378,487) in view of Salvat et al. (US Patent 6,412,276) as applied to claim 3 above, and further in view of Kitahara et al. (US 6,796,118).

Regarding claims 20-23, 25, 26, the modified Zukouski system discloses all the claimed limitations as discussed in claim 3 above, however, fails to disclose that the exhaust purifier includes an NOx trap catalyst device to trap NOx in a lean operation of the engine. Kitahara teaches an NOx trap catalyst device to trap NOx in a lean operation of the engine being located in the exhaust gas, and using a split combustion request at a time to purify the sulfur and NOx trapped in the NOx trap device in accordance with a distance traveled by a vehicle powered by the internal combustion engine (see col. 4, lines 10+, col. 5, lines 1-6).

It would have been obvious to one having ordinary skill in the art, to have utilized the teaching of Kitahara in the modified Zukouski system, since the use thereof would have provided an effective means for regenerating the Nox trap.

Regarding claim 24, Kitahara further teaches performing the split combustion request in accordance with an estimated sulfur content quantity of the sulfur content trapped in the NOx trap device (see col. 4, lines 10-38).

Conclusion

Any inquiry concerning this communication from the examiner should be directed to Examiner Diem Tran whose telephone number is (571) 272-4866. The examiner can normally be reached on Monday -Friday from 8:00 a.m.- 5:30p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas E. Denion, can be reached on (571) 272-4859. The fax number for this group is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 800-786-9199 (toll-free).

/Diem Tran/
Patent Examiner
/Thomas E. Denion/
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